

5 Environmental Threats to Greenhouses

Distributed by MicroDAQ.com, Ltd.
www.MicroDAQ.com
(603) 746-5524



Keeping your plants alive and healthy requires the best possible growing environment.

Greenhouse managers and personnel must constantly monitor environmental and equipment status, especially after hours or during the off-season. The only way to do this cost-effectively is by using a remote monitoring system. These systems are comprised of a base unit that is connected wirelessly or hardwired to sensors that are positioned throughout the greenhouse.

Remote monitoring systems instantly identify:

- Falling temperatures
- Frost
- Poor ventilation
- High CO₂ levels
- Humidity changes
- Frozen or ruptured irrigation lines
- Water leaks
- Heater, fan or other equipment failures
- Power Failures

Many operators rely on staff to manually monitor greenhouse conditions by walking the facility to physically check heaters, ventilation stacks, humidifiers, etc. However, this method is inefficient, time-consuming and vulnerable to error because humans can't physically watch every inch of your operation around the clock.

Remote monitoring systems are on duty 24/7. They can't stop unforeseen disasters, but they can alert you immediately to environmental changes that threaten your plant inventory and property. When any condition goes outside your preset parameters, the system instantly calls, texts or emails you and your staff.

The sooner someone discovers a problem, the more inventory you can save by taking preventive action. These systems prevent disasters and disease during both the growing season and the off-season.



PREVENT DISASTERS & DISEASE

Off-Season

Remote monitoring systems detect problems like extreme temperature fluctuation and frost, frozen irrigation lines, and heater and fan failures 24/7. If any condition goes outside your preset parameters, the system instantly alerts you by phone, email or text. This means you have an extra layer of protection when personnel are not on site, and you can check conditions from anywhere via the website.

Growing Season

During the growing season, remote monitoring systems monitor temperature, humidity levels, and circulation fan operation...the key factors that prevent mold, algae, mildew and disease and maximize your growing yield.



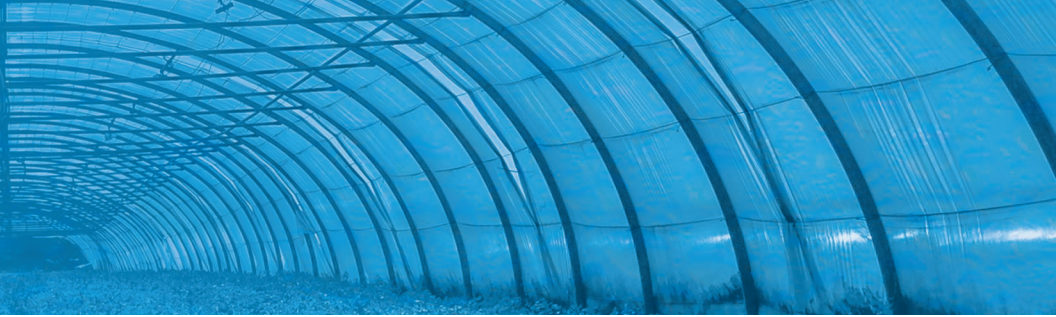
Threat #1: High/Low Temperatures

Keeping your plants alive and healthy requires the best possible growing environment, so maintaining a controlled temperature is crucial. Temperature affects plant anthesis, and extreme temperature fluctuations negatively impact both plant health and yield. A monitoring system checks temperature 24/7, whether or not personnel are onsite.

You set parameters for each sensor, such as minimum and maximum temperature. When the sensors detect readings outside of these limits, the unit automatically calls, texts or emails the staff members you have selected. It's important to position temperature sensors at each end and in the middle of your greenhouse to allow for fluctuations.

Spring and summer temperature monitoring

High temperatures can severely stress plants, cause leaves to wilt and dramatically affect the crops' ability to produce fruit. In addition, an overheated greenhouse causes the soil to dry out quicker and use much more water. By using a monitoring system, users can be alerted to threatening conditions before they become a problem.



Easier greenhouse winterization

Remote monitoring systems help winterize greenhouses properly. Growers no longer need to manually check temperatures throughout the late fall and winter season – a daunting and costly task, especially for larger facilities.

The system monitors temperatures during critical night hours when they are lowest. Time is critical when bad things happen like a heater failing or running out of fuel, or a tarp tearing from strong winds. Young plants with a weak root system can die within hours, and mature plants can be damaged. Getting a freeze alert within minutes can save an entire season's yield of crops.

MONITORING SYSTEMS ALERT YOU WHEN:

- ① **Temperatures reach unsafe levels**
- ② **Circulation fans or exhaust fans have mechanical issues**
- ③ **Vents fail to open to release heat**



Threat #2: High/Low Humidity

Humidity directly affects plant photosynthesis and transpiration, so controlling humidity is crucial in the greenhouse environment. Depending on the crop, proper humidity levels are typically maintained between 40-85% RH.

Low humidity levels mean the air contains less water vapor, causing plants to lose moisture quicker during the inhalation of carbon dioxide during photosynthesis. During the transpiration process, the pores on a plant's leaves open and take in carbon dioxide. Moisture escapes at a higher rate when the air around the plant is drier. When this occurs faster than the root system can send water to the plants leaves, the plant shuts down and dries out. Misters, foggers and humidifiers help raise humidity levels.

High humidity levels also negatively impact

transpiration. When plants absorb water and minerals from the soil through their roots, transpiration assists these nutrients to the leaves.

Ideal Humidity



FACTORS IMPACTED BY HUMIDITY

Low Humidity

- Poor transpiration
- Dry plants
- Poor photosynthesis



High Humidity

- Poor transpiration
- Poor nutrient absorption
- Poor self-cooling of plants
- Increased mold and fungal growth

If the moisture content within the air is too high, the process slows down, preventing the proper absorption of nutrients. Without the release of moisture, plants lose their ability to cool themselves. High humidity also aids the growth of mold and fungal diseases. Ventilation fans, dehumidifiers and opening greenhouse vents lower humidity levels.

Remote monitoring systems observe humidity levels 24/7. They can also monitor pumps, power, soil moisture content, pressure lines on your misters and controller alarm faults from a single unit.



Threat #3: Power and Equipment Failure

It is obvious that you would want to be notified immediately of any power outage. Your water well, heater fans, ventilation fans and louvers all require constant electrical power.

Critical greenhouse equipment powered by electricity:

- Water wells
- Heater fans
- Ventilation fans
- Louvers
- Sprinkler/watering systems
- Humidifiers
- Dehumidifiers

“The system gives me peace of mind knowing that we will be informed immediately in the event of a heater failure. Recently, when a heater failed in one of our greenhouses at 6 p.m., the system called our on-site manager. I was able to use a temporary backup system until the heater could be diagnosed and fixed. Those plants would have been exposed all night until the next shift started.”

– *Operations Manager for a large NJ-based producer of woody ornamentals*



“

Although the wind machines have sensors and auto starts, I need to be alerted before temperatures reach dangerous lows. If I am just a minute too late, it's all over.

”

– *Jamie Slingerland,*
Director of Viticulture at Pillitteri Estates Winery



Pillitteri Estates Winery



Threat #4: Ventilation

Greenhouses are designed to trap heat, but too much heat magnified in an enclosed area can quickly destroy plants. Proper ventilation prevents overheating and is critical to maintaining a healthy environment.

Ventilation not only cools a greenhouse, it also provides fresh air, which is needed to produce carbon dioxide. Plants that don't get enough CO₂ are unhealthy and typically have leggy growth. It's all about air exchange.

Most large greenhouse operations have automatic ventilation systems that regulate heat and humidity while providing the proper amount of fresh air. These systems include vented roofs, side vents and forced fans that run on electricity, so it makes sense to place sensors on these units that would alert if they stop running or begin operating outside of preset parameters.



I'm so pleased that we installed a remote monitoring system. I tell my peers in this business that this is a worthwhile investment because it literally pays for itself if it works one time.



– Mark Holmes,
Operations Manager of Medford Nurseries



Threat #5: Security

Remote monitoring systems can perform physical security functions. For example, you can add sensors to entrance doors, windows and doors to individual supply rooms.

To avoid receiving constant alerts on busy days, you can configure the monitoring system to alert you only after hours and on weekends.





Selecting the Right Monitoring System for Your Greenhouse

It's important to evaluate your specific needs so that you invest in the right monitoring system for your facility. You'll want to consider the following:

- Communications access at your site – phone, cellular, Wi-Fi, etc.
- Types and number of conditions to monitor
- Data logging needs
- Number of people to be alerted
- How you want staff to be notified
- Whether hardwired or wireless sensors would work better for your facility
- Basic versus expandable system

Because each condition you want to monitor requires its own input on the base unit, you have to match your needs with the number of inputs available. Lower-cost, non-expandable systems could meet the needs of smaller sites, whereas larger facilities have many monitoring points and more people to alert when there's a problem.



If your operation is poised for growth, purchasing an expandable system could add value to the initial purchase because you wouldn't have to replace the entire system as your operation grows.

Fast-growing operations should consider an expandable monitoring system.

An internal rechargeable battery backup is vital to ensure continuous monitoring and alerts in the event of a power outage. It's also a good idea to purchase a base unit that comes packaged in an enclosure to protect it from moisture, dirt and chemicals commonly found in a greenhouse environment.

Sensor placement is also very important, so be sure to consult with your monitoring system vendor. They can recommend optimal placement of sensors throughout your greenhouse operation to meet your monitoring goals.



Hardwired or Wireless Sensors

A hardwired monitoring system connects the sensors to the base device with wires and can involve trenching long distances. If hardwiring sensors is logistically difficult or cost-prohibitive at your location, you can select a system that uses wireless sensors with built-in radio transmitters to communicate with the base unit. Some monitoring systems can accommodate a combination of hardwired and wireless sensors.

Cellular Communications

Monitoring devices that use cellular communications must be registered on a wireless network before you can send or receive messages. Because cellular devices perform all communications over a wireless network, it is important that there be sufficient signal strength at the site. It is a good idea to check the signal quality in the area before purchasing a cellular product. If the cellular network has less than desirable coverage, it is possible to install an external antenna to help increase the cellular signal.



Programming and Status Checks

If you're responsible for maintaining a commercial greenhouse facility, you want a system that provides real-time status of all monitored conditions.

With a cloud-based system, the device stores all of the data in the cloud. This means users have access to the data from any internet connected device, such as a tablet or phone, and they can check the device status at any time.

Other monitoring systems use a phone (pots) line and users can call and interrogate the device for a status update.

Two options for accessing your sensor readings

- Calling to check status
- Viewing a web page
- Mobile App



Alarm Notification

When monitoring systems identify a change in status, they immediately send alerts to everyone on the contact list. Many devices can contact a second tier of personnel if nobody responds to the initial alarm. It's important to consider the reach of the communications so that you'll be notified regardless of your location. Multiple communication methods (phone, email and text) provide extra assurance that you'll get the alert. Also, note the number of people the system can reach and if the system automatically cycles through the contact list until someone responds. Make sure the system allows for flexible scheduling so that it doesn't send alarms to off-duty personnel.

Data Logging

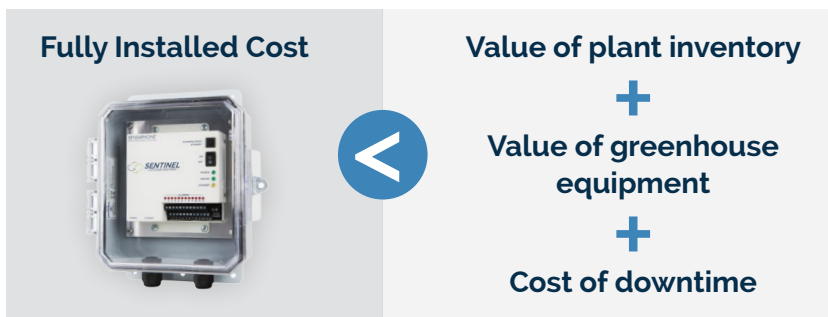
Data history is valuable in identifying patterns and trends in environmental conditions. However, manually monitoring and recording environmental parameters takes a significant amount of personnel time and detracts from other important workplace demands.

Many monitoring systems automatically save information, recording tens of thousands of data points, dates and times. Cloud-based logging provides an unlimited number of records to view, graph, print and export data trends.



Analyzing data samples may lend insight to larger issues and prevent problems before they arise. For example, if the data log shows power fluctuations occurring at a regular time, it could be indicative of a more serious problem. Or, if the data shows signs of a ventilation fan beginning to malfunction, it can be repaired or replaced before total failure occurs.

ROI CONSIDERATIONS



Return on Investment

When deciding how much you should pay for a remote monitoring system, tally up the entire cost, fully installed with additional peripherals and sensors and any labor fees for installation. Then consider the value of your plant inventory and greenhouse equipment. Finally, factor in the cost of downtime should an environmental event shut down your operation for a period of time.



Taking Control of Environmental Threats

Remote monitoring systems provide vital protection for your greenhouse. They monitor critical conditions like temperature, leaks, humidity, power failure, equipment failure – even physical security – to provide peace of mind. They provide vital information during the growing season and the off-season.

They also enable you to identify patterns and trends in environmental conditions and get insight to larger issues that can prevent problems before they arise. They do this by automatically recording tens of thousands of data points, dates and times that you can view, graph, and print.

Whether you are on site or off site when you have a monitoring system you are always aware of the critical conditions that threaten your property and plant inventory.

Remote monitoring systems

- Detect environmental threats
- Instantly inform you when conditions are less than perfect
- Provide an easy way to check on the status of conditions at any time



Have Questions? Need Advice?

Talk with a Sensaphone greenhouse monitoring expert today at **877-373-2700**, contact@sensaphone.com or visit www.sensaphone.com/greenhouse.

About Us

Since 1985, Sensaphone® has designed and built its full line of innovative remote environmental monitoring systems and early detection products that quickly and effectively provide alerts to problems at your facilities. Over 400,000 systems are in use today around the world with the highest customer satisfaction rates in the industry.

Sensaphone is a family-owned bussiness, and products are manufactured in the USA.

SENSAPHONE®

REMOTE MONITORING SOLUTIONS

901 Tryens Road, Aston, PA 19014
877-373-2700 • contact@sensaphone.com

